OIPE IAP59
FEB 0 9 2006
PATENT & TRADEMARK OFFICE

IPW
AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Roland A. Wood

Title: IMPROVED BOLOMETER OPERATION USING FAST SCANNING

Docket No.: H0001512-0760
Filed: March 6, 2001
Examiner: Shun Lee

Serial No.: 09/800,366
Due Date: February 20, 2006
Group Art Unit: 2878

MS Appeal Brief
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X A return postcard.
X A Second Supplemental Appellants' Brief On Appeal (48 Pages).

If not provided for in a separate paper filed herewith, Please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
Customer Number 00128

By: [signature]
Atty: Bradley A. Forrest
Reg. No. 30,837

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Appeal Brief, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 7th day of February, 2006.

Dawn M. Poole
Name

[signature]
Signature

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
(GENERAL)

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:		)	
Roland A. Wood		)	Examiner: Shun K. Lee
Serial No.:	09/800,366	)	Group Art Unit: 2878
Filed:	March 06, 2001	)	Docket: H0001512
For:	IMPROVED BOLOMETER OPERATION USING FAST SCANNING	)	

SECOND SUPPLEMENTAL APPELLANTS' BRIEF ON APPEAL

Mail Stop Appeal Brief- Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Second Supplemental Reply Brief is provided as a replacement for the previously filed briefs, and is in reply to the Notification of Non-Compliance mailed January 20, 2006 and in reply to the Examiner's Answer, mailed February 16, 2005 and in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on May 27, 2004, from the Final Rejection of claims 1-27 and 29-39 of the above-identified application, as set forth in the Final Office Action mailed on December 31, 2003.

While no additional fees are believed to be due at this time, if any fees are due, the Commissioner is authorized to charge Deposit Account No. 19-0743. The Appellants respectfully request consideration and reversal of the Examiner's rejections of pending claims.

SUPPLEMENTAL APPELLANTS' BRIEF ON APPEAL

TABLE OF CONTENTS

Page

1. REAL PARTY IN INTEREST

The real party in interest of the above-captioned patent application is the assignee, HONEYWELL INTERNATIONAL INC.

2. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present appeal.

3. STATUS OF THE CLAIMS

Claims 1-27 and 29-39 are pending in the application and have all been finally rejected. Claim 28 has been cancelled. The rejected claims 1-27 and 29-39 are the subject of the present appeal.

4. STATUS OF AMENDMENTS

An amendment was filed March 1, 2004 in response to the Final Office Action mailed to the Appellants on January 12, 2004. The Advisory Action of March 18, 2004 indicated that the amendment would be entered upon the filing of an appeal. It is to be noted that in the Response to the Final Office Action claims 15 and 29 were amended consistent with the recommendation of the Examiner, and the specification was also amended consistent with the suggestion of the Examiner to overcome objections to the specification and claims.

5. SUMMARY OF THE INVENTIVE SUBJECT MATTER - SUMMARY OF THE INVENTION

Claims 1-39

Claim 1 is shown in Figure 8 and described in the specification on page 10, lines 6-24.

Figure 8 illustrates an overview of one embodiment of the process 800 of the present invention. As illustrated in element 810, this process applies two or more bias pulses substantially sequentially to each of the microbolometers in an array such that a resulting temperature in each of the microbolometers in the array due to the applying of the two or more bias pulses is substantially uniform during a frame time. The frame time is the time it takes for the array to produce one complete image of an object being viewed by the array. The two or more bias pulses can be substantially equal in magnitude. The two or more bias pulses can also be substantially equally spaced in time. The two or more bias pulses can be voltage bias pulses or bias current signals. The number of the two or more bias pulses can be in the range of about 2 to 100 bias pulses. They can have time duration in the range of about 0.1 to 20 microseconds.

Element 820 measures two or more resulting signals corresponding to the two or more bias pulses applied to each of the microbolometers in the array during the frame time. Element 830 computes an average signal value from the measured two or more resulting signals corresponding to each of the microbolometers in the array during the frame time. Element 840 produces an output signal based on the computed average signal value for each of the microbolometers in the array during the frame time to improve performance, sensitivity, and facility of operation of an array including one or more microbolometers.

Claim 2 is shown in Figure 8 and described in the specification on page 10, lines 24-25.

The above elements are repeated during each frame time to produce a realistic image of an object being viewed using the array.

Claim 3 is shown in Figure 8 and described in the specification on page 11, lines 2-5.

The process 800 further includes applying a corrective electrical signal to the output signal to correct for resistance non-uniformity between the one or more microbolometers in the array to obtain a uniform output signal value.

Claim 4 is shown in Figure 8 and described in the specification on page 10, lines 25-28.

The process 800 can include converting the uniform output signal value associated with each of the microbolometers of the array to a digital signal value using an integrator and an A/D converter.

Claim 5 and 6 are shown in Figure 8 and described in the specification on page 10, line-28 to page 11, line 2.

The process 800 can also include passing the digital signal value associated with each of the microbolometers in the array through a digital image processor to correct for image defects such as fine offsets, gain non-uniformity, or dead pixels or any other such correcting operations to enhance the image quality.

Claim 7 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

The two or more bias pulses can be substantially equal in magnitude.

Claim 8 is shown in Figure 8 and described in the specification on page 10, lines 13-14.

The two or more bias pulses can also be substantially equally spaced in time.

Claim 9 and 10 are shown in Figure 8 and described in the specification on page 10, line 14.

The two or more bias pulses can be voltage bias pulses or bias current signals.

Claim 11 is shown in Figure 8 and described in the specification on page 10, lines 15.

The number of the two or more bias pulses can be in the range of about 2 to 100 bias pulses.

Claim 12 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

They can have time duration in the range of about 0.1 to 20 microseconds.

Claim 13 is shown in Figure 8 and described in the specification on page 10, lines 10-12.

The frame time is the time it takes for the array to produce one complete image of an object being viewed by the array.

Claim 14 is shown in Figure 9 and described in the specification on page 11, line 8, to page 12, line 9.

Figure 9 illustrates major portions of an infrared radiation detector apparatus 900 and their interconnections according to the present invention. The infrared radiation detector apparatus 900 includes the microbolometer array 110, ROIC 115, and an output circuit 950. The ROIC 115 includes a timing circuit 920, a measuring circuit 930, and a computing circuit 940.

The timing circuit 920 is coupled to the microbolometer array 110 such that the timing circuit 920 can apply two or more bias pulses substantially sequentially to each of the microbolometers in the array 110 such that the resulting temperature in each of the microbolometers in the array 110 due to the application of the two or more bias pulses 510 is substantially uniform during a frame time 410. The frame time 410 is the time it takes for the microbolometer array 110 to produce a complete image of an object being viewed by the microbolometer array 110. The operation of the microbolometer array 110 has been described in detail with reference to Figures 1 and 2.

In some embodiments, the two or more bias pulses 510 are substantially equal in magnitude. The two or more bias pulses 510 can be substantially equally spaced in time within the frame time 410. The two or more bias pulses 510 can be voltage bias pulses. The two or more bias pulses 510 can be current signals. The number of the two or more bias pulses 510 can be approximately in the range of about 2 to 100 bias pulses. The two or more bias pulses 510 have a time duration of approximately in the range of about 0.1 to 20 microseconds.

The measuring circuit 930 is coupled to the microbolometer array 110 such that the measuring circuit 930 can measure two or more resulting signals associated with each of the two or more bias pulses 510 applied during the frame time 410. The computing circuit 940 is coupled to the measuring circuit 930 so that the computing circuit receives the two or more resulting signals from the measuring circuit 930 and computes an average signal value for each of the received two or more resulting signals from the measuring circuit 930. Then the output circuit 950 coupled to the computing circuit 940 produces an output signal based on the computed average signal value associated with each of the microbolometers in the array 110 such that the output signal improves performance, sensitivity, and facility of operation of the microbolometer array.

Claim 15 is shown in Figure 9 and described in the specification on page 12, lines 10-14.

In some embodiments, the output circuit further includes an integrator and an A/D converter 300. The integrator and the A/D converter 300 receives the uniform output signal value associated with each microbolometer in the array 110 and converts the uniform output signal value to a digital signal value. The operation of the integrator and the A/D converter 300 has been discussed in detail with reference to Figure 3.

Claim 16 is shown in Figure 9 and described in the specification on page 12, lines 15-19.

In some embodiments, the infrared radiation detector apparatus 900 further includes a digital image processor 340. The digital image processor 340 is coupled to the output circuit 950 to receive the digital signal value associated with each of the microbolometers in the array 110.

Claim 17 and 18 are shown in Figure 9 and described in the specification on page 12, lines 19-22.

The digital image processor 340 is coupled to the output circuit 950 to correct the received digital signal value for image defects such as fine offsets, gain non-uniformity, or dead pixels, and can further correct for any resistance non-uniformity in each microbolometer in the array (to obtain a uniform output signal value) using a correction circuit 360 to improve the image quality.

Claim 19 is shown in Figure 9 and described in the specification on page 12, lines 22-23.

The digital image processor 340 can further include digital memories 350 to store the correction values associated with each of the microbolometers in the array 110.

Claim 20 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

The two or more bias pulses can be substantially equal in magnitude.

Claim 21 is shown in Figure 8 and described in the specification on page 10, lines 13-14.

The two or more bias pulses can also be substantially equally spaced in time.

Claim 22 and 23 are shown in Figure 8 and described in the specification on page 10, line 14.

The two or more bias pulses can be voltage bias pulses or bias current signals.

Claim 24 is shown in Figure 8 and described in the specification on page 10, lines 15.

The number of the two or more bias pulses can be in the range of about 2 to 100 bias pulses.

Claim 25 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

They can have time duration in the range of about 0.1 to 20 microseconds.

Claim 26 is shown in Figure 8 and described in the specification on page 10, lines 10-12.

The frame time is the time it takes for the array to produce one complete image of an object being viewed by the array.

Claim 27 is shown in Figure 9 and described in the specification on page 11, line 8, to page 12, line 9.

Figure 9 illustrates major portions of an infrared radiation detector apparatus 900 and their interconnections according to the present invention. The infrared radiation detector apparatus 900 includes the microbolometer array 110, ROIC 115, and an output

circuit 950. The ROIC 115 includes a timing circuit 920, a measuring circuit 930, and a computing circuit 940.

The timing circuit 920 is coupled to the microbolometer array 110 such that the timing circuit 920 can apply two or more bias pulses substantially sequentially to each of the microbolometers in the array 110 such that the resulting temperature in each of the microbolometers in the array 110 due to the application of the two or more bias pulses 510 is substantially uniform during a frame time 410. The frame time 410 is the time it takes for the microbolometer array 110 to produce a complete image of an object being viewed by the microbolometer array 110. The operation of the microbolometer array 110 has been described in detail with reference to Figures 1 and 2.

In some embodiments, the two or more bias pulses 510 are substantially equal in magnitude. The two or more bias pulses 510 can be substantially equally spaced in time within the frame time 410. The two or more bias pulses 510 can be voltage bias pulses. The two or more bias pulses 510 can be current signals. The number of the two or more bias pulses 510 can be approximately in the range of about 2 to 100 bias pulses. The two or more bias pulses 510 have a time duration of approximately in the range of about 0.1 to 20 microseconds.

The measuring circuit 930 is coupled to the microbolometer array 110 such that the measuring circuit 930 can measure two or more resulting signals associated with each of the two or more bias pulses 510 applied during the frame time 410. The computing circuit 940 is coupled to the measuring circuit 930 so that the computing circuit receives the two or more resulting signals from the measuring circuit 930 and computes an average signal value for each of the received two or more resulting signals from the measuring circuit 930. Then the output circuit 950 coupled to the computing circuit 940 produces an output signal based on the computed average signal value associated with each of the microbolometers in the array 110 such that the output signal improves performance, sensitivity, and facility of operation of the microbolometer array.

Claim 29 is shown in Figure 9 and described in the specification on page 12, lines 10-14.

In some embodiments, the output circuit further includes an integrator and an A/D converter 300. The integrator and the A/D converter 300 receives the uniform output signal value associated with each microbolometer in the array 110 and converts the uniform output signal value to a digital signal value. The operation of the integrator and the A/D converter 300 has been discussed in detail with reference to Figure 3.

Claim 30 is shown in Figure 9 and described in the specification on page 12, lines 15-19.

In some embodiments, the infrared radiation detector apparatus 900 further includes a digital image processor 340. The digital image processor 340 is coupled to the output circuit 950 to receive the digital signal value associated with each of the microbolometers in the array 110.

Claim 31 are shown in Figure 9 and described in the specification on page 12, line 27 to page 12, line 11.

The measuring circuit 930 is coupled to the microbolometer array 110 such that the measuring circuit 930 can measure two or more resulting signals associated with each of the two or more bias pulses 510 applied during the frame time 410. The computing circuit 940 is coupled to the measuring circuit 930 so that the computing circuit receives the two or more resulting signals from the measuring circuit 930 and computes an average signal value for each of the received two or more resulting signals from the measuring circuit 930. Then the output circuit 950 coupled to the computing circuit 940 produces an output signal based on the computed average signal value associated with each of the microbolometers in the array 110 such that the output signal improves performance, sensitivity, and facility of operation of the microbolometer array.

Claim 32 is shown in Figure 9 and described in the specification on page 12, lines 22-23.

The digital image processor 340 can further include digital memories 350 to store the correction values associated with each of the microbolometers in the array 110.

Claim 33 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

The two or more bias pulses can be substantially equal in magnitude.

Claim 34 is shown in Figure 8 and described in the specification on page 10, lines 13-14.

The two or more bias pulses can also be substantially equally spaced in time.

Claim 35 and 36 are shown in Figure 8 and described in the specification on page 10, line 14.

The two or more bias pulses can be voltage bias pulses or bias current signals.

Claim 37 is shown in Figure 8 and described in the specification on page 10, line 15.

The number of the two or more bias pulses can be in the range of about 2 to 100 bias pulses.

Claim 38 is shown in Figure 8 and described in the specification on page 10, lines 11-12.

They can have time duration in the range of about 0.1 to 20 microseconds.

Claim 39 is shown in Figure 8 and described in the specification on page 10, lines 10-12.

The frame time is the time it takes for the array to produce one complete image of an object being viewed by the array.

This summary does not provide an exhaustive or exclusive view of the present subject matter, and Appellant refers to the appended claims and their legal equivalents for a complete statement of the invention.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 2, 7, 9-17, 20 and 22-26 stand rejected under 35 USC § 102(b) as being anticipated by Wood et al (U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419).

Claims 3-5 stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Applicant's Admitted Prior Art.

Claim 6 stands rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Applicant's Admitted Prior Art as applied to claim 5 above, and further in view of Thiede et al. (U.S. Patent No. 5,129,595).

Claims 8, 21, 27, 29, and 33-39 stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Duvall, III (U.S. Patent No. 5,258,619).

Claims 18 and 19 stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Thiede et al. (U.S. Patent No. 5,129,595).

Claims 30-32 stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view Duvall, III as applied to claim 29 above, and further in view of Thiede et al.

8. ARGUMENT

1) The Applicable Law under 35 U.S.C. § 102(b)

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *M.P.E.P. ' 2131.* To anticipate a claim, a reference must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter. *PPG Industries, Inc. V. Guardian Industries Corp.*, 75 F.3d 1558, 37 USPQ2d 1618 (Fed. Cir. 1996). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

2) The Applicable Law under 35 U.S.C. § 103

The Examiner has the burden under 35 U.S.C. 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). As part of establishing a *prima facie* case of obviousness, the Examiner must show that some objective teaching in the prior art or some knowledge generally available to one of ordinary skill in the art would lead an individual to combine the relevant teaching of the references. *Id.*

The court in *Fine* stated that:

> Obviousness is tested by "what the combined teaching of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 878 (CCPA 1981)). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *ACS Hosp. Sys.*, 732 F.2d at 1577, 221 USPQ at 933. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* (emphasis in original).
>
> The M.P.E.P. adopts this line of reasoning, stating that
> "In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally; the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed

combination and the reasonable expectation of success must both be found in the prior art, and not based on Appellant s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991))". *M.P.E.P.* 2142

The test for obviousness under § 103 must take into consideration the invention as a whole; that is, one must consider the particular problem solved by the combination of elements that define the invention. *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985). The Examiner must, as one of the inquiries pertinent to any obviousness inquiry under 35 U.S.C. § 103, recognize and consider not only the similarities but also the critical differences between the claimed invention and the prior art. *In re Bond*, 910 F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied*, 1990 U.S. App. LEXIS 19971 (Fed. Cir. 1990). Finally, the Examiner must avoid hindsight. *Id.*

Anticipation via a single prior art reference requires the disclosure in the reference of each element of the claim under consideration. *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897, 1908 (Fed. Cir. 1990) (en banc), cert. denied, 500 U.S. 904 (1991).

3) Discussion of the Rejection of the Claims 1, 2, 7, 9-17, 20 and 22-26 under 35 U.S.C. § 102(b) as being anticipated by Wood et al. (U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419)

It should be noted that Mr. Wood, the inventor on the present application, and an inventor or co-inventor on the cited Wood and Wood et al., references is the same person. The currently claimed invention is an improvement on his previous work. It is clear that Mr. Wood, as confirmed by his signing the Declaration, has sworn that he believes the invention as claimed in the current application is new and non-obvious over at least his prior published work. The combination of references does not teach or suggest each and every element of the claimed invention, and should be overturned.

During prosecution, Applicant argued for patentability of the pending claims because the references do not teach or suggest the use of two bias pulses in a time frame as claimed, as well as further elements referencing the use of two or more bias pulses. Examiner's answer states that a "frame time is the time in which a microbolometer produces a complete picture or image of an object being viewed (see lines 6 and 7 on pg. 2 of the specification." Continuing on with the cited language on succeeding lines of the specification: "The frame time is typically 1/30th of a second. In order to allow the microbolometer to respond adequately to time-dependent changes in the detected infrared radiation, the thermal response time of each microbolometer is typically adjusted, to be about the same value as the frame time." The background section of the application further describes the problem of heating caused by bias pulses that is over and above the heating caused by incident IR radiation, making it difficult to detect.

As explained in the responses during prosecution, Wood in FIG. 6 and in col. 6, lines 18-26 describes applying a single bias pulse to each microbolometer in each frame time. Further, Wood in claim 19, lines 22-24 describes sweeping the receiving units (i.e., microbolometers in the array) with a single pulse (i.e., a 5 microsecond bias pulse) of short duration, in relation to the time required to sweep said array (i.e., 80,000 pixel array). Using a 5 microsecond bias pulse per microbolometer in an 80,000 pixel array and addressing 14 pixels at a time in the array results in a frame time of approximately about 1/30th of a second, which is about a typical frame time required to scan an infrared

image. In contrast, the claimed embodiments of the present application recite "to apply two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time". Wood does not teach applying two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time. In contrast, Wood describes applying a single, 5 microsecond, bias pulse to each microbolometer in an, 80,000 microbolometer, array. The difference is clearly shown in the present application between FIG. 4, prior art, and FIG. 5 of the presently claimed invention. The temperature is much more constant in FIG. 5.

Wood et al. in col. 5, lines 17-23 and lines 53-55 describe scan times of not more than 1 second. In addition, Wood et al. in col. 5, lines 40-47 describe scanning using a moveable board and then measuring signals from individual pixels and does not describe applying two or more bias pulses to each of the microbolometers as recited in the claims of the present application. Further, Wood et al. in col. 5, lines 47-53 describe performing multiple scans of any desired region of a scene and do not describe application of two or more bias pulses substantially sequentially to each microbolometer in the array in each frame time (i.e., each scan) as recited in the claims. Furthermore, Wood et al. in col.5, lines 47-53 describe averaging of the signals obtained in multiple scans of any desired region of the scene and do not describe measuring the two or more signals associated with each of the applied two or more bias pulses during a frame time as recited in the claims.

Applicant further addresses the Examiner's rejections as follows. Each of the pending claims references the use of two or more bias pulses during a frame time. The Examiner cited Wood '419 as showing a timing circuit coupled to the array to apply (US 5,420,419 column 6, lines 18-34) two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time (i.e., the exposure time for producing a complete image; column 5, lines 47-53). It is believed that the reference to column 5, lines 47-53 is meant to be to Wood et al. '149. That language indicates that multiple scans may be employed "to allow sensitivity improvement by multiple measurement and averaging of sensor signals: in this case, a stable platform for example, a tripod mounting of the camera may be required, analogous to long exposures of visible

photographic still frame cameras." This language seems to refer to the scanning of each of bolometers multiple times, and then averaging. It does not teach or suggest the use of applying two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time as claimed. Wood et al. '149 is referring to multiple scans, and then averaging the multiple scans. Each scan is akin to a time frame as that term is used in the present application.

In the May 27, 2004 response to the Final Rejection, Applicant argued that the cited references do not describe the claimed use of two or more bias pulses during a frame time and cited U.S. Patent 5,420,419 column 3, lines 40-54. However, in the Advisory Action the Examiner disagreed.

U.S. Patent 5,420,419 column 3, lines 40-54 states: "The iris may be closed momentarily (e.g., after camera manufacture, or at camera start-up) to allow the image processor 80 to average several image frames and store this digital data in a long-lived digital memory (which may be in the image processor systems). A simple expedient of a lens cap or shutter may be employed instead, if desired. During normal camera operation the iris 72 remains permanently open, or partially closed if it is desired to reduce the radiation intensity falling on the focal plane. The image processor subtracts the incoming signals from the digital data in its long-lived memory on a pixel-by-pixel basis. This provides offset correction for each pixel in the image to be viewed by a human observer, a requirement and process well known to those in the art".

In the Advisory Action the Examiner concluded that it is clear that the passage cited by Applicant relates to obtaining correction data using a process well known to those in the art. The Examiner further states that US Patent 5,420,419 (Wood) Fig. 6 illustrates the effect of the application of pulse bias voltage (two are shown) to the passive elements of the focal plane array over time (see also US 5,420,419 column 6, lines 18-34) and US Patent 5,675,149 (Wood et at.) column 5, lines 47-53 states "if desired, slower slide velocities, or multiple scans of any desired region of the scene, can be employed to allow sensitivity improvement by multiple measurement and averaging of sensor signals: in this case, a stable platform for example, a tripod mounting of the camera may be required, analogous to long exposures of visible photographic still frame

cameras". The Examiner further concludes: "Thus analogous to long exposures of visible photographic still frame cameras, each scan of multiple scans have a pulse bias voltage applied to the focal plane array passive elements wherein the resulting multiple sensor signal measurements are then averaged. Therefore during the exposure time for producing a complete image (i.e., the frame time), the complete image was produced from an average of multiple sensor signal measurements wherein each measurement was obtained by the application of a pulse bias voltage to the focal plane array passive elements."

However, as previously explained, this clearly does not anticipate the claimed embodiments of present application. The prior art references to not disclose or suggest the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, nor measuring the two or more signals associated with each of the applied two or more bias pulses during a frame time.

The references also do not teach the elements of the claims as arranged in the claims. Wood '419 in column 6, lines 40 et. Seq., recites: "Because of the short duration of the time in which to read out signals in an array to produce a moving video image recognizable as a real time image by human beings, high band width amplifiers are used in the preamp 74 of FIG. 1." This language implies that a time frame is very short, and is consistent with the use of the term in the present application. However, Wood et al. 149, a still frame camera, is cited by the Examiner as averaging scans for a full second, which appears not to be compatible with producing real time video. Thus, it is not proper to select teaching from the two applications that is clearly not compatible, and rearrange it to arrive at the presently claimed invention. In fact, to maintain consistency between the references, one of skill in the art would say that Wood et al. '149 averages data from multiple scans to arrive at an averaged image frame. The use of the word frame in Wood et al. '149 refers to a still image frame, not a "time frame" for a video image as used in the present application.

In the Examiner's Answer on page 4, it is stated that "time is inherent in displaying an image corresponding to the output signals." Applicant is not sure how to interpret this statement. To prove inherency, the examiner must provide basis in fact

and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. The Answer only argued that time is inherent in displaying an image corresponding to the output signals. Thus, the Office Action does not even assert that the allegedly inherent characteristic is necessary, let alone provide a basis in fact and/or technical reasoning. As indicated previously, a frame may be simply an image, and not a time frame.

Claim 1

Independent claim 1 is directed to a method for improving performance sensitivity and facility of operation of an array including one or more microbolometers, comprising: applying two or more bias pulses substantially sequentially during a frame time to each microbolometer in the array; measuring two or more resulting signals corresponding to the two or more bias pulses; computing an average signal value from the two or more resulting signals corresponding to each microbolometer in the array during the frame time; and producing an output signal based on the computed average signal value for each microbolometer in the array during the frame time. However, as previously explained, the prior art references to not disclose or suggest the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, nor the measurement of two or more signals associated with each of the applied two or more bias pulses during a frame time. Therefore, claim 1 is believed to be allowable for the reasons set forth above.

Wood et al. describes a still frame camera, where multiple scans may be used to increase sensitivity. Wood describes the problem of heating in a video application, where there is a limited time to scan all the pixels, so a single pulse is employed to reduce heat. These approaches are solving different problems, and there is no teaching or suggestion in the application that these distinct elements may be combined. In other words, the reference does not teach the use of substantially sequential pulses to each microbolometer in an array in each time frame, and the rejection should be reversed.

The Examiner's Answer indicates that "the method steps are implicit for the apparatus of Wood et al. since the structure is the same as the applicant's apparatus of

claim 14." This statement is also not understood, and appears to be attempting to invoke inherency. Devices may perform many different methods, and there is no showing that the apparatus of Wood et al. can perform the invention as claimed. As previously indicated, Wood et al. takes still pictures or frames, and does not refer to time frames.

Claim 2

Dependent claim 2, which is dependent on claim 1, further claims repeating the applying, measuring, computing, and producing steps to compute output signals during each frame time. Claim 2 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each a time. It also further distinguishes from Wood et al. '149 in that it references more frame times, whereas the reference specifically refers to a still frame camera. The Examiner's Answer refers to column 1, lines 55-58 of Wood et al., where images of a slow moving targets are photographed at 1 second intervals. The images are distinct images, and not video images, and there is no suggestion of the use of bias pulses substantially sequentially during a frame time.

Claim 7

Dependent claim 7, which is dependent on claim 1, further claims the bias pulses being substantially equal in magnitude. Claim 7 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in a frame time.

Claim 9

Dependent claim 9, which is dependent on claim 1, further claims the two or more bias pulses comprising two or more voltage bias pulses. Claim 9 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer

in an array in a frame time.

Claim 10

Dependent claim 10, which is dependent on claim 10, further claims the two or more resulting signals comprising two or more current signals. Claim 10 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in a frame time.

Claim 11

Dependent claim 11, which is dependent on claim 1, further claims the bias pulses being in the range of about 2 to 100 bias pulses. Claim 11 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in a frame time.

Claim 12

Dependent claim 12, which is dependent on claim 1, further claims each of the two or more bias pulses having a time duration in the range of about 0.1 to 20 microseconds. Claim 12 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 13

Dependent claim 13, which is dependent on claim 1, further claims the frame time being the time it takes for the array to produce a complete image of an object being viewed by the array. Claim 13 is believed to be allowable for all the reasons argued with respect to claim 1. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

The Examiner's Answer again refers to time being inherent. The previous

discussion of such inherency is incorporated here in response.

Claim 14

Independent claim 14 is directed to an infrared radiation detector apparatus, comprising: microbolometers in an array; a timing circuit coupled to the array to apply two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time; a measuring circuit coupled to the array to measure two or more resulting signals associated with each of the applied two or more bias pulses during the frame time; a computing circuit coupled to the measuring circuit to compute an average signal value for each microbolometer in the array from the measured two or more resulting signals during the frame time; and an output circuit coupled to the computing circuit to produce an output signal based on the computed average signal value for each microbolometer in the array during the frame time. However, as previously explained, the prior art references to not disclose or suggest the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, nor the measurement of two or more signals associated with each of the applied two or more bias pulses during a frame time. Therefore, claim 14 is believed to be allowable for the reasons set forth above.

Claim 15

Dependent claim 15, which is dependent on claim 14, further claims an integrator and an A/D converter wherein said output signal produced is a digital signal value for each microbolometer in the array. Claim 15 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 16

Dependent claim 16, which is dependent on claim 15, further claims a digital image processor, coupled to the output circuit to receive the digital signal value

associated with each microbolometer of the array and to correct the received digital signal value for image defects. Claim 16 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 17

Dependent claim 17, which is dependent on claim 16, further claims a correction circuit, to apply a corrective electrical signal based on a correction value to the output signal to correct for resistance non-uniformity in each microbolometer to obtain a uniform output signal value. Claim 17 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 20

Dependent claim 20, which is dependent on claim 14, further claims the two or more bias pulses being substantially equal in magnitude. Claim 20 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 22

Dependent claim 22, which is dependent on claim 14, further claims the two or more bias pulses being voltage bias pulses. Claim 22 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 23

Dependent claim 23, which is dependent on claim 22, further claims the resulting signals being current signals. Claim 23 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 24

Dependent claim 24, which is dependent on claim 14, further claims the two or more bias pulses being in the range of about 2 to 100 bias pulses. Claim 24 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 25

Dependent claim 25, which is dependent on claim 24, further claims the two or more bias pulses having time duration in the range of about 0.1 to 20 microseconds. Claim 25 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

Claim 26

Dependent claim 26, which is dependent on claim 14, further claims the frame time being the time it takes for the array to produce a complete image of an object being viewed by the array. Claim 26 is believed to be allowable for all the reasons argued with respect to claim 14. Especially in regards to the application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time.

4) Discussion of claims 3-5 which stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Applicant's Admitted Prior Art.

Claim 3

Dependent claim 3, which is dependent on claim 2, further claims applying a corrective electrical signal to the output signal to correct for resistance non-uniformity between the one or more microbolometers in the array to obtain a substantially uniform output signal value. Additionally, in rejecting claim 3, the Examiner stated that Applicant admits (first paragraph on pg. 6) it is known in the art (such as US Patent 4,752,694) to apply a corrective electrical signal to the output signal to correct for resistance non-uniformity between the one or more microbolometers of the array (ie., "coarse non-uniforinity correction") to obtain a substantially uniform output signal value. The Examiner then concluded that it would have been obvious to one having ordinary skill in the art to apply a corrective electrical signal in the method of Wood et al., in order to obtain a substantially uniform output signal value. However, there is no discussion in the reference of application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been anticipated by either of the Wood references. Applicant believes that claim 3 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 4

Dependent claim 4, which is dependent on claim 3, further claims converting the substantially uniform output signal value associated with each microbolometer in the array to a digital signal value. Additionally, in rejecting claim 4, the Examiner stated that Wood et al. also disclose (column 2, lines 57-59) an integrator (integrating preamplifiers 26) and an A/D converter (32) to converting the substantially uniform output signal associated with each microbolometer to a digital signal value. However, there is no discussion in the reference of application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been

anticipated by either of the Wood references. Applicant believes that claim 4 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 5

Dependent claim 5, which is dependent on claim 4, further claims passing the digital signal value associated with each microbolometer in the array through a digital image processor to correct for image defects. Additionally, in rejecting claim 5, the Examiner stated that Wood et al. also disclose (column 4, lines 5-24) passing the digital signal values associated with each microbolometer in the array through a digital image processor to correct for image defects. However, there is no discussion in the reference of application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 5 is in condition for allowance and respectfully requests the withdrawal of all rejections.

5. Discussion of claim 6 which stands rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Applicant's Admitted Prior Art as applied to claim 5 above, and further in view of Thiede et al. (U.S. Patent No. 5,129,595).

Claim 6

Dependent claim 6, which is dependent on claim 5, further claims image defects selected from the group consisting of fine offsets, gain non-uniformity, and dead pixels. Additionally, in rejecting claim 6, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 6 is in condition for allowance and respectfully requests the withdrawal of all rejections.

6. Discussion of claims 8, 21, 27, 29, and 33-39 which stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Duvall, III (U.S. Patent No. 5,258,619).

Claim 8

Dependent claim 8, which is dependent on claim 1, further claims the bias pulses being substantially equally spaced in time. Additionally, in rejecting claim 8, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 8 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 21

Dependent claim 21, which is dependent on claim 20, further claims the two or more bias pulses being substantially equally spaced in time. Additionally, in rejecting claim 21, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 21 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 27

Independent claim 27 is directed to a signal processing electronics circuit for an array including one or more microbolometers, comprising: a timing circuit coupled to the array to apply two or more bias pulses substantially sequentially to each microbolometer in the array such that the resulting temperature in each microbolometer in the array due to the application of the bias pulses is substantially uniform during a frame time; a measuring circuit coupled to the array to measure two or more resulting signals, respectively associated with each of the applied bias pulses during the frame time; a computing circuit coupled to the measuring circuit to compute an average signal value for each microbolometer in the array from the measured resulting signals during the frame time; and an output circuit coupled to the computing circuit to produce an output signal based on the computed average signal value for each microbolometer in the array during the frame time.

Claim 27 thus distinguishes the references at least based on the provision of two or more substantially sequential bias pulses in a given frame time. Duvall, III is cited as providing a swept bias technique that includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, etc to minimize unwanted detector heating. However, there is no suggestion to use such techniques within a given frame time as claimed in claim 27. Thus, the combination of the references does not teach or suggest such a combination. Wood already uses a single pulse in a frame time to reduce heat generation. As shown in Prior art FIG. 4 of the present application, corresponding to FIG. 6 of Wood, the temperature is not constant. FIG. 5 of the present application shows a significant difference provided by the use of multiple bias pulses in a given frame time. Thus, the invention as claimed is not shown or suggested by the references, and the rejection should be reversed.

Claim 29

Dependent claim 29, which is dependent on claim 27, further claims the output circuit further comprising an integrator and an A/D converter wherein said output signal produced is a digital signal value for each microbolometer in the array. Additionally, in

rejecting claim 29, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 29 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 33

Dependent claim 33, which is dependent on claim 31, further claims the two or more bias pulses being substantially equal in magnitude. Additionally, in rejecting claim 33, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 33 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 34

Dependent claim 34, which is dependent on claim 33, further claims the two or more bias pulses being substantially equally spaced in time. Additionally, in rejecting claim 34, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector

heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 34 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 35

Dependent claim 35, which is dependent on claim 27, further claims the two or more bias pulses being voltage bias pulses. Additionally, in rejecting claim 35, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 35 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 36

Dependent claim 36, which is dependent on claim 35, further claims the resulting signals being current signals. Additionally, in rejecting claim 36, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 36 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 37

Dependent claim 37, which is dependent on claim 27, further claims the two or more bias pulses being in the range of about 2 to 100 bias pulses. Additionally, in rejecting claim 37, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 37 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 38

Dependent claim 38, which is dependent on claim 37, further claims the two or more bias pulses having time duration in the range of about 0.1 to 20 microseconds. Additionally, in rejecting claim 38, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 38 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 39

Dependent claim 39, which is dependent on claim 27, further claims the frame time being the time it takes for the array to produce a complete image of an object being viewed by the array. Additionally, in rejecting claim 39, the Examiner cited Duvall, III as

teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 39 is in condition for allowance and respectfully requests the withdrawal of all rejections.

7. Discussion of claims 18 and 19 which stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view of Thiede et al. (U.S. Patent No. 5,129,595).

<u>Claim 18</u>

Dependent claim 18, which is dependent on claim 17, further claims the correction circuit further correcting the uniform output signal value for fine offsets, gain non-uniformity, or dead pixels. Additionally, in rejecting claim 18, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 18 is in condition for allowance and respectfully requests the withdrawal of all rejections.

<u>Claim 19</u>

Dependent claim 19, which is dependent on claim 18, further claims digital memories to store the correction values for each microbolometer in the array. Additionally, in rejecting claim 19, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 19 is in condition for allowance and respectfully requests the withdrawal of all rejections.

8. Discussion of claims 30-32 which stand rejected under 35 USC § 103(a) over Wood et al.(U.S. Patent No. 5,675,149) and incorporated by reference Wood (U.S. Patent No. 5,420,419) in view Duvall, III as applied to claim 29 above, and further in view of Thiede et al.

Claim 30

Dependent claim 30, which is dependent on claim 29, further claims a digital image processor coupled to the output circuit to receive the digital signal value associated with each microbolometer to correct for image defects such as fine offsets, gain non-uniformity or dead pixels. Additionally, in rejecting claim 30, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. Also, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 30 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 31

Dependent claim 31, which is dependent on claim 30, further claims a correction circuit to apply a corrective electrical signal based on a correction value to the output signal to correct for any resistance non-uniformity in each microbolometer to obtain a uniform output signal value. Additionally, in rejecting claim 31, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. Also, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a

given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 31 is in condition for allowance and respectfully requests the withdrawal of all rejections.

Claim 32

Dependent claim 32, which is dependent on claim 31, further claims a memory to store the correction value associated with each microbolometer in the array. Additionally, in rejecting claim 32, the Examiner cited Thiede et al. as teaching (column 7, lines 45-66) the correction of gain non-uniformity and dead pixels in order to fully compensate for array non-uniformity. Also, the Examiner cited Duvall, III as teaching (column 6, lines 43-53) that a swept bias technique includes adjusting the waveform parameters of rise-time, fall-time, peak to peak values, time between pulses, pulse slope, pulse width, and pulse amplitude which best meets a given detector and design situation in order to minimize unwanted detector heating. However, the language cited does not teach an application of two or more bias pulses substantially sequentially to each microbolometer in an array in each frame time, which has not been disclosed by either of the Wood references. Applicant believes that claim 32 is in condition for allowance and respectfully requests the withdrawal of all rejections.

9. SUMMARY

Applicant believes the claims are in condition for allowance and requests withdrawal of the rejections to claims 1-27 and 29-39. Reversal of the Examiner's rejections of claims 1-27 and 29-39 in this appeal is respectfully requested.

Respectfully submitted,

ROLAND A. WOOD

By his Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402

Date 2-7-2006 By ____________________
Bradley A. Forrest
Reg. No. 30,837

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 7th day of February, 2006.

Name Dawn M. Poole

Signature ____________________

APPENDIX I

The Claims on Appeal

1. (Rejected) A method for improving performance sensitivity and facility of operation of an array including one or more microbolometers, comprising:

applying two or more bias pulses substantially sequentially during a frame time to each microbolometer in the array;

measuring two or more resulting signals corresponding to the two or more bias pulses;

computing an average signal value from the two or more resulting signals corresponding to each microbolometer in the array during the frame time; and

producing an output signal based on the computed average signal value for each microbolometer in the array during the frame time.

2. (Rejected) The method of claim 1, further comprising:

repeating the applying, measuring, computing, and producing steps to compute output signals during each frame time.

3. (Rejected) The method of claim 2, further comprising:

applying a corrective electrical signal to the output signal to correct for resistance non-uniformity between the one or more microbolometers in the array to obtain a substantially uniform output signal value.

4. (Rejected) The method of claim 3, further comprising:

converting the substantially uniform output signal value associated with each microbolometer in the array to a digital signal value.

5. (Rejected) The method of claim 4, further comprising:

passing the digital signal value associated with each microbolometer in the array through

a digital image processor to correct for image defects.

6. (Rejected) The method of claim 5, wherein the image defects comprises:
image defects selected from the group consisting of fine offsets, gain non-uniformity, and dead pixels.

7. (Rejected) The method of claim 1, wherein the bias pulses are substantially equal in magnitude.

8. (Rejected) The method of claim 1, wherein the bias pulses are substantially equally spaced in time.

9. (Rejected) The method of claim 1, wherein the two or more bias pulses comprise:
two or more voltage bias pulses.

10. (Rejected) The method of claim 1, wherein the two or more resulting signals comprises:
two or more current signals.

11. (Rejected) The method of claim 1, wherein the bias pulses are in the range of about 2 to 100 bias pulses.

12. (Rejected) The method of claim 1, wherein each of the two or more bias pulses has a time duration in the range of about 0.1 to 20 microseconds.

13. (Rejected) The method of claim 1, wherein the frame time is the time it takes for the array to produce a complete image of an object being viewed by the array.

14. (Rejected) An infrared radiation detector apparatus, comprising:

microbolometers in an array;

a timing circuit coupled to the array to apply two or more bias pulses substantially sequentially to each microbolometer in the array during a frame time;

a measuring circuit coupled to the array to measure two or more resulting signals associated with each of the applied two or more bias pulses during the frame time;

a computing circuit coupled to the measuring circuit to compute an average signal value for each microbolometer in the array from the measured two or more resulting signals during the frame time; and

an output circuit coupled to the computing circuit to produce an output signal based on the computed average signal value for each microbolometer in the array during the frame time.

15. (Rejected) The apparatus of claim 14, wherein the output circuit further comprises:

an integrator and an A/D converter wherein said output signal produced is a digital signal value for each microbolometer in the array.

16. (Rejected) The apparatus of claim 15, further comprising:

a digital image processor, coupled to the output circuit to receive the digital signal value associated with each microbolometer of the array and correct the received digital signal value for image defects.

17. (Rejected) The apparatus of claim 16, wherein the digital image processor further comprises:

a correction circuit, to apply a corrective electrical signal based on a correction value to the output signal to correct for resistance non-uniformity in each microbolometer to obtain a uniform output signal value.

18. (Rejected) The apparatus of claim 17, wherein the correction circuit further corrects the uniform output signal value for fine offsets, gain non-uniformity, or dead pixels.

19. (Rejected) The apparatus of claim 18, wherein the digital image processor further comprises:

digital memories to store the correction values for each microbolometer in the array.

20. (Rejected) The apparatus of claim 14, wherein the two or more bias pulses are substantially equal in magnitude.

21. (Rejected) The apparatus of claim 20, wherein the two or more pulses are substantially equally spaced in time.

22. (Rejected) The apparatus of claim 14, wherein the two or more bias pulses are voltage bias pulses.

23. (Rejected) The apparatus of claim 22, wherein the resulting signals are current signals.

24. (Rejected) The apparatus of claim 14, wherein the two or more bias pulses are in the range of about 2 to 100 bias pulses.

25. (Rejected) The apparatus of claim 24, wherein the two or more bias pulses have time duration in the range of about 0.1 to 20 microseconds.

26. (Rejected) The apparatus of claim 14, wherein the frame time is the time it takes for the array to produce a complete image of an object being viewed by the array.

27. (Rejected) A signal processing electronics circuit for an array including one or more

microbolometers, comprising:

a timing circuit coupled to the array to apply two or more bias pulses substantially sequentially to each microbolometer in the array such that the resulting temperature in each microbolometer in the array due to the application of the bias pulses is substantially uniform during a frame time;

a measuring circuit coupled to the array to measure two or more resulting signals, respectively associated with each of the applied bias pulses during the frame time;

a computing circuit coupled to the measuring circuit to compute an average signal value for each microbolometer in the array from the measured resulting signals during the frame time; and

an output circuit coupled to the computing circuit to produce an output signal based on the computed average signal value for each microbolometer in the array during the frame time.

28. (Canceled)

29. (Rejected) The circuit of claim 27, wherein the output circuit further comprises:

an integrator and an A/D converter wherein said output signal produced is a digital signal value for each microbolometer in the array.

30. (Rejected) The circuit of claim 29, further comprising:

a digital image processor coupled to the output circuit to receive the digital signal value associated with each microbolometer to correct for image defects such as fine offsets, gain non-uniformity or dead pixels.

31. (Rejected) The circuit of claim 30, wherein the digital image processor further comprises:

a correction circuit to apply a corrective electrical signal based on a correction value to the output signal to correct for any resistance non-uniformity in each microbolometer to obtain a uniform output signal value.

32. (Rejected) The circuit of claim 31, further comprising:

a memory to store the correction value associated with each microbolometer in the array.

33. (Rejected) The circuit of claim 27, wherein the two or more bias pulses are substantially equal in magnitude.

34. (Rejected) The circuit of claim 33, wherein the two or more bias pulses are substantially equally spaced in time.

35. (Rejected) The circuit of claim 27, wherein the two or more bias pulses are voltage bias pulses.

36. (Rejected) The circuit of claim 35, wherein the resulting signals are current signals.

37. (Rejected) The circuit of claim 27, wherein the two or more bias pulses are in the range of about 2 to 100 bias pulses.

38. (Rejected) The circuit of claim 37, wherein the two or more bias pulses have time duration in the range of about 0.1 to 20 microseconds.

39. (Rejected) The circuit of claim 27, wherein the frame time is the time it takes for the array to produce a complete image of an object being viewed by the array.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APENDIX

None.